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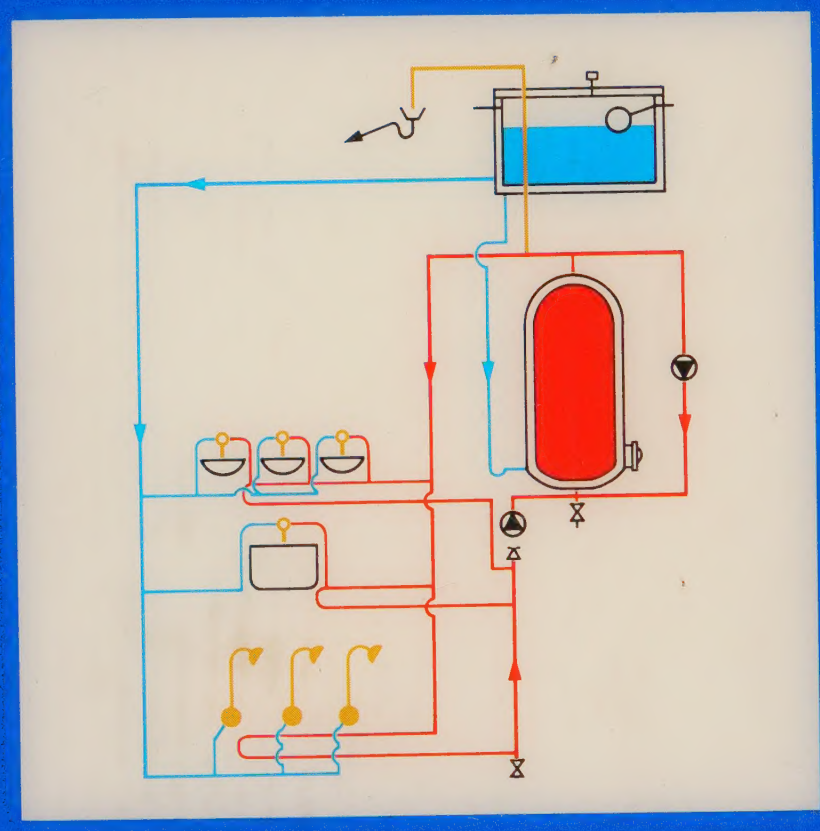
Health Technical Memorandum 2027

Validation and verification

Hot and cold water supply, storage and mains services



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An Executive Agency of the Department of Health

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Health Technical Memorandum 2027

Validation and verification

Hot and cold water supply, storage and mains services

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About this publication

Health Technical Memorandum (HTM) 2027 provides recommendations, advice and guidance on the design, installation and maintenance of hot and cold water distribution systems in healthcare premises. It is applicable to new and existing sites, and is for use at various stages during the inception, design, upgrading, refurbishment, extension and maintenance of a building.

HTM 2027 focuses on the:

a. legal and mandatory requirements;

b. design of systems;

c. maintenance of systems;

d. operation of systems.

It is published as four separate volumes, each addressing a specialist discipline:

a. **Management policy** – details the overall responsibility of managers of healthcare premises and their legal obligations in setting up and operating a reliable water supply, storage and distribution system. It summarises the technical aspects involved;

b. **Design considerations** – does not set out to give instruction in design work but highlights the overall requirements and considerations that should be applied to the design up to the contract document;

c. this volume – **Validation and verification** – details the requirements for ensuring that the supply, storage and distribution system is formally tested and certified as to contract and manufactured to the highest level of quality assurance. The importance of commissioning is emphasised and the minimum of tests on site are listed;

d. **Operational management** – provides information for those responsible for overseeing and operating day-to-day running

and maintenance. Safe systems of work, record-keeping and legal obligations are included.

Guidance in this Health Technical Memorandum is complemented by the library of National Health Service Model Engineering Specifications. Users of the guidance are advised to refer to the relevant specifications.

The contents of this Health Technical Memorandum in terms of management policy, operational policy and technical guidance are endorsed by:

a. the Welsh Office for the NHS in Wales;

b. the Health and Personal Social Services Management Executive in Northern Ireland;

c. the National Health Service in Scotland Management Executive;

and they set standards consistent with Departmental Cost Allowance Guides.

This HTM was written with the advice and assistance of experts in the NHS and industry.

References to legislation appearing in the main text of this guidance apply in England and Wales. Where references differ for Scotland and/or Northern Ireland, these are given in marginal notes.

Where appropriate, marginal notes are also used to amplify the text.

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1.0 Introduction

1.1 This volume outlines the principles involved in the commissioning and testing of the hot and cold water supply and distribution systems for healthcare premises. It includes cold water storage cisterns, hot water storage cylinders and heat exchangers, together with water treatment and pressurisation units, pipework systems and circulation pumps. This volume will apply to all healthcare premises, but some deviation may become necessary where the differing requirements for the various water undertakers must be met.

1.2 Although many of its recommendations will be applicable, this document does not set out to cover fire-fighting services, nor water supply for industrial or other specialist purposes other than to indicate precautions that should be taken when these are used in association with other water services. The point at which a domestic activity becomes an industrial process, for example in food preparation, has not been defined and the applicability will need to be considered in each case.

1.3 As well as complying with the recommendations outlined in this document, any work relating to the commissioning and testing of the hot and cold water services, new or extended, in any healthcare premises shall also comply with:

a. the current Model Water Byelaws of the local water undertakers;

b. BS6700:1987, the British Standard Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages;

c. CIBSE Commissioning Code W: Water Distribution Systems.

1.4 In 1989 new model water byelaws came into effect and these are set out, along with the water industry's interpretation of these provisions, in the 'Water Supply Byelaws Guide 1989'. The WRc (Water Research Centre) operates the Evaluation and Testing Centre which provides advice on byelaws on a national basis and administers the Water Byelaws Scheme which tests and lists water fittings and materials for compliance with the byelaws. The 'Water Fittings and Materials Directory' contains information on suitable fittings and materials and is updated every six months.

1.5 It is required that any persons proposing to carry out works on cold water distribution systems liaise closely with the water undertakers.

1.6 Whilst some guidance on the water services applications mentioned below is given in this memorandum, it is not intended to cover them fully:

laundry – see Health Building Note 25;

sterile supply departments – see Health Building Note 13;

hydrotherapy pools – see Public Health Laboratory service booklet 'Hygiene for Hydrotherapy Pools'.

Definitions

1.7 Definitions of terms are those contained in the Model Water Byelaws, BS6100 Section 2.7 and 3.3 and BS6700.

2.0 General requirements

Installation checks

2.1 The system should be regularly checked during installation to ensure that open pipes, valve ends, cylinder connections, etc are sealed to prevent the ingress of dust/debris which could cause problems during commissioning and subsequent operation. Checks should also be made to ensure that fittings and materials are those listed in 'The Water Fittings and Materials Directory' and that lead solders are not being used.

Inspection of joints

2.2 Before pressure testing, the site engineer should identify a number of fittings to be cut out for examination in order to establish whether the quality of the finished joint meets the specification. The exact number to be cut out will vary according to the size of the installation, but as a guide a ratio of one fitting per 200 installations should be cut out. In any event, a minimum of two and not normally more than five fittings should be cut out for examination.

2.3 The fittings cut out should be cut open (quartered longitudinally) and examined. If unacceptable joints are found, adjacent fittings should be cut out until the extent of any faulty workmanship has been established.

2.4 The pipeline should be made good.

2.5 The tube and fitting should be internally clean and free from particulate matter. Some heat burnishing may be apparent and is acceptable.

Penetration of brazing alloy and solder

2.6 Due to tolerances of the capillary space on these pipes and fittings, full penetration of the brazing alloy may not occur and is not necessary.

2.7 The minimum penetration at any point must be three times the wall thickness of the tube or 3 mm, whichever is the greater.

Commissioning

2.8 Correct commissioning is vitally important for the satisfactory operation of the hot and cold water systems.

2.9 The hot and cold water service systems should be commissioned and tested in accordance with the guidelines set out in BS6700, which details procedures to ensure that:

a. materials and equipment installed comply with other British Standards, and with the latest edition of the Water Fittings and Materials Directory, and are not otherwise unsuitable;

b. the work is done entirely within the specification for the scheme;

c. the installation complies in every respect with the water byelaws and regulations and the requirements of British Standards;

d. all the requirements of current legislation are met, both during construction of the installation and when it is completed, particularly with regard to the Health and Safety at Work etc Act 1974.

2.10 "As installed" record drawings and operating/maintenance instructions must be supplied at the time of handover. Schematics will also be useful. Certified records of pressure testing and disinfection should also be made available.

2.11 The whole commissioning procedure should be carried out under the guidance of a single authority, although the involvement of specialists or manufacturers may be required for specific items of plant.

2.12 The commissioning engineer will need to obtain a commissioning brief which lists the various tests and measurements that are to be checked and recorded. Such data should include:

a. full design data on temperatures, water flow rates and pressures;

b. plant and equipment data;

c. drawings and schematics;

d. a list of test certificates to be provided.

2.13 Valid calibration certificates should be submitted and checked for all measuring equipment to be used by the commissioning engineers prior to commencement of commissioning.

2.14 The commissioning should be carried out in a logical and methodical manner.

2.15 Guidance on procedures to be followed is given in CIBSE Commissioning Code W: Water Distribution Systems.

2.16 The installation, on completion, should be operated by the contractor as a whole and subjected to specified functional or performance tests.

2.17 Once the system meets the design intent, the final completion record sheet(s) should be completed. In the event of performance not being acceptable, the matter should be dealt with in accordance with the contract requirements.

3.0 Commissioning and testing checklists

3.1 The following is a summary of the key activities associated with pre-commissioning and commissioning of hot and cold water storage and distribution systems. The list is not intended to be comprehensive.

Cold water installations

3.2 Pre-commissioning checks can be carried out upon completion of the system installation, filling and pressure testing.

3.3 Pre-commissioning checks and tests to be applied are as follows. Check that:

a. systems have been provided and installed in accordance with specification and drawings and that the systems are charged with water, vented and free from leaks;

b. water storage cisterns are free from distortion and leaks, are properly supported and secured, are provided with correctly fitting covers and are in accordance with Water Byelaw 30;

c. distribution pipework is rigidly supported, insulated and incorporates adequate provisions for venting, draining, expansion, isolation and measurement of flow, temperature and pressure;

d. pipework systems have been pressure tested;

e. pipework systems and storage cisterns have been flushed, disinfected, appropriate certification received and that specified residual chlorine levels are attained;

f. pipework systems and storage/break tanks are correctly identified and marked;

g. regulating valves and flow control devices operate freely;

h. water meter(s) is/are fitted correctly;

j. electrical isolation, cross bonding and wiring of system components are installed in accordance with the current edition of BS7671.

3.4 Upon satisfactory completion of the pre-commissioning tests, the commissioning tests can then be started.

3.5 Commissioning checks and tests to be applied are as follows. Check that:

a. overflows run freely and discharged water does not cause flooding or damage, and that drain-down points flow when released and are free from leaks when shut;

b. float operated valves function satisfactorily and are adjusted to give the correct water level;

c. control valves operate correctly and shut-off valves close tightly;

d. all electrical circuits are tested and the pump motor direction of rotation is correct, and that electrical controls and alarms function correctly;

e. operation of any safety or anti-flood device is satisfactory;

f. circulating or lifting pumps are free from excessive noise, vibration and leaks;

g. remote control of pumps (if appropriate) is satisfactory;

h. the installation is vented and regulated;

j. the flow rate into and out of storage cisterns is recorded;

k. all taps, mixers and outlets operate satisfactorily; and test and record mass flow from outlets in positions shown on contract drawings;

m. temperature of water in storage cisterns and at taps is appropriate;

n. full load current of components does not exceed the recommended values;

p. the running current of components does not exceed the recommended values;

q. pump thermal overload trips are set;

r. system schematic is displayed in a frame in the relevant plantroom.

Hot water installations

3.6 Pre-commissioning checks can be carried out upon completion of system installation, filling and pressure testing.

3.7 Pre-commissioning checks and tests to be applied are as follows. Check that:

a. systems have been provided and installed in accordance with the specification and drawings;

b. the system is charged with cold water, vented and free from leaks;

c. hot water storage vessels are free from leaks and are properly supported and secured;

d. distribution pipework is rigidly supported, insulated and incorporates adequate provision for venting, drainage, expansion, isolation, and measurement of flow, temperature and pressure;

e. pipework systems, storage cylinders, etc have been pressure tested, flushed and disinfected, and appropriate certification has been received; and that specified residual chlorine levels are attained;

f. pipework systems, calorifiers and cisterns are correctly identified and marked;

g. regulating valves and flow control devices operate freely;

h. all control and regulating valves are labelled or marked to correspond with reference numbers on contract drawings;

j. electrical isolation, cross bonding and wiring of system components is installed in accordance with the current edition of BS7671;

k. system schematic is displayed in a frame in the relevant plantroom.

3.8 Upon satisfactory completion of the pre-commissioning checks, the commissioning checks and tests can then be started.

3.9 Commissioning checks and tests to be applied are as follows. Check that:

a. drain-down points flow when released and are free from leaks when shut; and that air vents and release valves open correctly and are airtight when shut off;

b. all temperature and other controls are adjusted and calibrated to agreed design limits of system performance;

c. all electrical circuits are tested and the pump motor direction of rotation is correct and that electrical controls and alarms function correctly;

d. control valves operate correctly and shut-off valves close tightly;

e. heat exchangers operate satisfactorily;

f. primary heating circuits are adjusted and regulated, and thermostatic settings are correct; and that bypass circuits and automatic control valves operate correctly;

g. circulating pumps are free from excessive noise, vibration and leaks;

h. remote and automatic control of pumps (if appropriate) is satisfactory;

j. there are no leaks at joints under maximum flow conditions;

k. secondary circuits are regulated and vented;

m. thermostatic mixing and regulating valves are adjusted and set to desired values;

n. all taps, mixers and outlets operate satisfactorily;

p. water flow quantities at all plant items, regulating valves and flow measuring valves are recorded;

q. mass flow from taps, main and other outlets in positions shown on contract drawings is satisfactory;

r. pressure drop at heat exchangers at full design demand flow is tested and recorded;

s. hydraulic balancing of hot water secondary circulation system is carried out to ensure that minimum temperatures are achieved in all parts of the circuit;

t. full load current of components does not exceed the recommended values;

u. the running current of components does not exceed the recommended values;

v. pump thermal overload trips are set.

4.0 Associated activities

Pressure testing

4.1 Pressure testing must be carried out before disinfection. Except where otherwise specified, testing of underground pipelines should be carried out in accordance with BS5886, CP 312 and CP 2010, as appropriate for the pipeline material.

4.2 Open pipes should be capped and valves closed to avoid contamination.

Temperature testing

4.3 These tests should be performed prior to contractual handover and bringing the system into use. Separate thermostatic measuring and recording equipment should be used, that is, independent of any building management system. It will be necessary to have systems fully operational and to simulate typical draw-off of water.

4.4 Tests should include:

a. measuring the incoming water temperature at the main water meter;

b. testing the inlet, outlet and surface water temperatures of cisterns and cold water feed/header tanks for the hot water calorifiers. The temperature should not be greater than 2°C above that measured at (a);

c. testing the flow and return temperatures of calorifiers and water heaters. These should not be less than 60°C and 50°C respectively;

d. testing the temperature at hot and cold water draw-off points, at sinks, wash-hand basins and baths, etc. A steady state temperature of between 50°C (nominally 55°C) and 60°C at hot water draw-off points should be reached within one minute. At cold water draw-off points; a temperature of not greater than 2°C above the temperature measured in a cold water storage tank should be reached within one minute;

e. testing the thermostatic mixing valves to ensure they achieve the correct outlet temperature, for example 43°C to 48°C maximum;

f. testing the outlet temperature of bidets, which should be 37°C to 38°C.

Disinfection

General

4.5 The system should be disinfected in accordance with HTM 2040 'The control of legionellae in healthcare premises – a code of practice' and should be brought into use within seven days of disinfection having been carried out unless all of the following are adhered to:

a. hot water temperatures are maintained;

b. cold water temperatures are maintained;

c. regular flushing (every seven days) is carried out.

4.6 Once filled, systems should not be drained unless full disinfection is to be undertaken before the system is brought into use again.

4.7 For design-and-build contracts, the brief must include the requirement that adequate certification of disinfection is provided by the contractor. On other contracts, tests must be witnessed and certified. During the post-handover period prior to occupation it is the client's responsibility to ensure that system temperatures are maintained and regular flushing is carried out, or to implement full re-disinfection.

Cold water systems

4.8 The requirements for disinfection subsequent to flushing out to remove debris, etc are essentially those given in HTM 2040 'The control of legionellae in healthcare premises – a code of practice'. Further guidance is available in 'Pre-Commission Cleaning of Water Systems', issued by BSRIA, 1991, which deals with design/installation considerations, system flushing and chemical cleaning.

4.9 Alternative disinfectants may be used provided satisfactory disinfection is achieved. The infection control team should be consulted and advice should also be sought from the Drinking Water Inspectorate.

4.10 Proprietary solutions of disinfectant should be used in accordance with the manufacturers' instructions. The COSHH Regulations require that the risks from using the disinfectant for each task are assessed to ensure that the control procedures adopted are suitable for the particular application.

4.11 A suitable proprietary test kit should be used for site measurements of residual disinfection agents.

4.12 Disinfection should not be undertaken before materials, for example linings in cisterns, have fully cured.

4.13 Pipework under pressure from the mains should be disinfected through an injection point and the disinfectant residual measured at the end of the pipeline. It is normal water industry practice to use a chlorine dose of not less than 20 mg/*l* (ppm) and, because the nature of the installation is likely to lead to unavoidable contamination, it is usual practice to leave the chlorine solution in the pipes for 24 hours before thoroughly flushing out with fresh water. Junctions which are to be inserted into existing pipelines should be disinfected prior to installation.

4.14 All disinfection of pipework under pressure from the mains must be carried out in accordance with the requirements of the local water undertaking. Failure to ensure close liaison between the contractor and the water undertakers during design, construction, pressure testing or commissioning could present a potential risk of back-flow of contaminated materials or chemicals into the public water supply. Site supervision to ensure compliance with any requirements specified by the local water undertaking is strongly recommended.

4.15 All cistern(s) should be internally cleaned to remove all visible dirt and debris. Cistern(s) and distributing pipework should be drained, filled with fresh water and then drained completely. The cistern(s) should then be refilled and their supply servicing valves closed. On re-fitting it is normal practice to add high doses of sodium hypochlorite to the water in the cistern(s), for example to give a calculated chlorine concentration of 50 ± 10 mg/*l* (ppm) in the water, and leave the water to stand for one hour. Whatever disinfection method is used, the concentration should be adjusted if necessary. The use of a high dose ensures an

adequate residual concentration to allow proper disinfection of the downstream services. Each tap or fitting should then be opened, progressively away from the cistern(s), and water discharged until the disinfectant is detected. Each tap or fitting should then be closed, and the cistern and pipes left charged for a further one hour. The tap(s) furthest from the cistern(s) should be opened and the level of disinfectant in the water discharged from the tap(s) measured. If the levels set are not achieved, the disinfection process should be repeated.

4.16 As soon as possible after disinfection, the distribution pipework should be drained and thoroughly flushed through with fresh water and re-filled (see paragraphs 4.6 and 4.7). Appropriate hazard warnings should be placed on all taps throughout the building during disinfection procedures.

4.17 After disinfection, microbiological tests for bacteria colony counts at 22°C and 37°C and coliform bacteria including *Escherichia coli* for drinking water at 37°C and 44°C should be carried out under the supervision of the infection control team to establish that the work has been satisfactorily completed. Water samples should be taken from selected areas within the distribution system. The system should not be brought into service until the infection control team certifies that the water is of potable quality.

Hot water installations

4.18 Cold feed cisterns, hot water calorifiers, water heaters, direct-fired HWS boilers and distribution pipework should be disinfected in accordance with the procedures described for cold water installations. Advice should be sought from equipment manufacturers to ensure that proposed disinfection chemicals will not adversely affect performance. No heat source should be applied during the disinfection procedure, including final flushing.

Discharge of waste water used during disinfection procedures within buildings

4.19 Contaminated water that is run to waste into a natural watercourse or a drain leading to it should be treated in accordance with the requirements of the authority responsible for land drainage and pollution control. The authority responsible for that sewer should be informed. Dechlorination can be achieved using either sulphur dioxide or sodium thiosulphate. 20 g of sodium thiosulphate crystals are required to dechlorinate 500 litres of water containing 20 mg/*l* free chlorine.

5.0 Documentation

5.1 It is essential that a full report of all commissioning and testing activities is compiled and handed over to the responsible engineer for incorporation within the operation and maintenance manuals.

5.2 These commissioning and testing records will be required in order that hospital maintenance personnel can make periodic checks to ensure that the installation continues to operate as intended.

References

Statutory requirements

Health and Safety at Work etc Act 1974. HMSO 1974.

Model Water Supply Byelaws. HMSO 1986.

SI 3246:1994 Control of Substances Hazardous to Health (COSHH) Regulations. HMSO 1994.

SI 2932:1992 The Provision and Use of Work Equipment Regulations. HMSO 1992.

SI 1039:1978 (NI 9) Health and Safety at Work (Northern Ireland). HMSO 1978.

SI 374:1990 (NI 9) Control of Substances Hazardous to Health (COSHH) Regulations (Northern Ireland).

British Standards

BS5886:1980 Methods for field pressure testing of asbestos-cement pipelines.

BS6700:1987 Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.

BS7671:1992 Requirements for electrical installations (IEE Wiring Regulations). Sixteenth edition.

BS6100 Glossary of building and civil engineering terms.

Section 2.7:1992 Public Health. Environmental Engineering.

Section 3.3:1992 Sanitation.

CP 312 Code of practice for plastic pipework (thermoplastic material).

CP 2010 Code of practice for pipelines.

NHS Estates publications

Health Building Note 25 – Laundry. HMSO 1994.

Health Building Note 13 – Sterile services department. HMSO 1993.

Health Technical Memorandum 2040 – The control of legionellae in healthcare premises – a code of practice. HMSO 1993.

National Health Service Model Engineering Specifications. NHS Estates 1993, 1995. (2 vols electrical, 2 vols mechanical)

Other publications

Post commissioning documentation for health buildings in Scotland (SHTN 1). Scottish Office, HMSO 1993.

Water Fittings and Materials Directory. Water Research Centre, published every 6 months.

Water supply byelaws guide. Water Research Centre, 1989.

Dadswell, J. V. **Hygiene for hydrotherapy pools.** Public Health Laboratory Service, 1990.

Parsloe, C. J. **Pre-commissioning Cleaning of Water Systems (AG 8/91).** Building Services Research and Information Association Publications (BSRIA), 1991.

Water distribution. Commissioning code series W. Chartered Institute of Building Service Engineers, 1994.

Other publications in this series

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2050	Risk assessment in the NHS estate, 1994.
51 to 53	–
2055	Telecommunications (telephone exchanges), 1994.

Component Data Base (HTMs 54 to 70)

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55	Windows, 1989.
56	Partitions, 1989.
57	Internal glazing*
58	Internal doorsets, 1989.
59	Ironmongery†
60	Ceilings, 1989.
61	Flooring*
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63	Fitting storage systems, 1989.
64	Sanitary assemblies*
65	Health signs*
66	Cubicle curtain track, 1989.
67	Laboratory fitting-out system, 1993.
68	Ducts and panel assemblies, 1993.
69	Protection, 1993.
70	Fixings, 1993.
71	Materials management modular system*
72 to 80	–

Firecode

81	Firecode: fire precautions in new hospitals*
81	Supp 1, 1993.
82	Firecode: alarm and detection systems, 1989.
83	Fire safety in healthcare premises: general fire precautions, 1994.
85	Firecode: fire precautions in existing hospitals, 1994.
86	Firecode: fire risk assessment in existing hospitals, 1994.
87	Firecode: textiles and furniture, 1993.
88	Fire safety in health care premises: guide to fire precautions in NHS housing in the community for mentally handicapped/ill people, 1986.

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Concode – outlines proven methods of selecting contracts and commissioning consultants. Reflects official policy on contract procedures. *HMSO*

Works Information Management System – a computerised information system for estate management tasks, enabling tangible assets to be put into the context of servicing requirements. *NHS Estates*

Health Building Notes – advice for project teams procuring new buildings and adapting or extending existing buildings. *HMSO*

Health Guidance Notes – an occasional series of publications which respond to changes in Department of Health policy or reflect changing NHS operational management. Each deals with a specific topic and is complementary to a related HTM. *HMSO*

Firecode – for policy, technical guidance and specialist aspects of fire precautions. *HMSO*

Capital Investment Manual Database – software support for managing the capital programme. Compatible with the Capital Investment Manual.
NHS Estates

Model Engineering Specifications – comprehensive advice used in briefing consultants, contractors and suppliers of healthcare engineering services to meet Departmental policy and best practice guidance. *NHS Estates*

Quarterly Briefing – gives a regular overview on the construction industry and an outlook on how this may affect building projects in the health sector, in particular the impact on business prices. Also provides information on new and revised cost allowances for health buildings. Published four times a year; available on subscription direct from NHS Estates. *NHS Estates*

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